

Notice of Allowability

Application No.

10/825,373

Examiner

Jennifer Doan

Applicant(s)

SAKAI ET AL.

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment filed on January 17, 2007.
2. ☒ The allowed claim(s) is/are 2,4-15 and 18.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

Jennifer Doan
JENNIFER DOAN
PRIMARY EXAMINER

EXAMINER'S STATEMENT OF REASONS FOR ALLOWANCE

Response to Amendment

1. Applicant's amendment filed on January 17, 2007 has been fully considered and entered.

Reasons for Allowance

2. Claims 2, 4-15 and 18 are allowed.

3. The following is an examiner's statement of reasons for allowance:

The prior art of record fails to disclose or reasonably suggest all the limitations recited in claim 2. Specifically, the prior art of record fails to disclose a light control element comprising an optical coupling component provided on the substrate by a photonic crystal structure, the optical waveguides being connected to said optical coupling component; and wherein an interface between said regions changes a traveling direction of a light incident thereto by causing reflection in at least one wavenumber of the light in response to a change of refractive index in the variable refractive index part in combination with the other limitations of claim 2.

Claims 9-15 depend from claim 2.

The prior art of record fails to disclose or reasonably suggest all the limitations recited in claim 4. Specifically, the prior art of record fails to disclose a light control

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element comprising an optical coupling component formed of a photonic crystal and provided on the substrate in a polygonal form, at least four of the optical waveguides being coupled to the optical coupling component; a plurality of variable refractive index parts formed in the polygonal optical coupling component, the plurality of variable refractive index parts being formed in one or more regions of the polygonal optical coupling component divided from each other by a diagonal line, the plurality of variable refractive index parts changing a refractive index thereof independently, and the light control element deflecting a traveling direction of light in the optical waveguide in response to a change of refractive index of the variable refractive index part in combination with the other limitations of claim 4.

The prior art of record fails to disclose or reasonably suggest all the limitations recited in claim 5. Specifically, the prior art of record fails to disclose a light control element comprising an optical coupling component formed of a photonic crystal and provided on the substrate in a polygonal form, at least four of the optical waveguides being coupled to the optical coupling component; a plurality of variable refractive index parts formed of the photonic crystal and provided on the optical waveguide in correspondence to regions of the polygonal optical coupling component divided from each other by a diagonal line, the plurality of variable refractive index parts changing a refractive index thereof independently, and the light control element deflecting a traveling direction of light in the optical waveguide in response to a change of refractive

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index of the variable refractive index part in combination with the other limitations of claim 5.

The prior art of record fails to disclose or reasonably suggest all the limitations recited in claim 6. Specifically, the prior art of record fails to disclose a light control element comprising an optical coupling component formed of a photonic crystal and provided on the substrate in a polygonal form, at least four of the optical waveguides being coupled to the optical coupling component; a plurality of variable refractive index parts formed in respective regions of the polygonal optical coupling components, the regions being divided from each other by a diagonal line of said polygonal optical coupling component, the variable refractive index parts changing a refractive index thereof independently, and the light control element branching a light in the optical waveguide in response to a change of refractive index of the variable refractive index part in combination with the other limitations of claim 6.

The prior art of record fails to disclose or reasonably suggest all the limitations recited in claim 7. Specifically, the prior art of record fails to disclose a light control element comprising first and second photonic crystals formed on an optical waveguide coupled to the optical coupling component at an end part thereof coupled to the optical coupling component, the first photonic crystal including a structure for reflecting or transmitting a transverse electric mode wave, the second photonic crystal including a structure for reflecting or transmitting a transverse magnetic mode wave; and first and

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second variable refractive index parts provided respectively by the first and second photonic crystals, the first variable refractive index part and the second variable refractive index part respectively changing a transmittance of said transverse electric mode wave and a transmittance of the transverse magnetic mode wave independently from each other, the light control element separating a transverse electric mode wave and a transverse magnetic mode wave in response to a change of refractive index of the first and second variable refractive index parts in combination with the other limitations of claim 7.

The prior art of record fails to disclose or reasonably suggest all the limitations recited in claim 8. Specifically, the prior art of record fails to disclose a light control element comprising first and second photonic crystals formed on an optical waveguide coupled to the optical coupling component at an end part thereof coupled to the optical coupling component, the first and second photonic crystals respective including a structure for reflecting or transmitting a transverse electric mode wave and a structure for reflecting or transmitting a transverse magnetic mode wave; and first and second variable refractive index parts formed respectively in said first and second photonic crystals, the first variable refractive index part and the second variable refractive index part changing a transmittance of the transverse electric mode wave and a transmittance of the transverse magnetic mode wave respectively by changing a refractive index of the first and second variable refractive index parts independently in combination with the other limitations of claim 8.

The prior art of record fails to disclose or reasonably suggest all the limitations recited in claim 18. Specifically, the prior art of record fails to disclose a light control element comprising N^2 optical coupling components provided to one of the intersections of the optical waveguides; and wherein an interface between said regions changes a traveling direction of a light incident thereto by causing reflection in at least one wavenumber of the light in response to a change of refractive index in the variable refractive index part in combination with the other limitations of claim 18.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer Doan whose telephone number is (571) 272-2346. The examiner can normally be reached on Monday to Thursday from 6:00am to 3:30pm, second Friday off.

5. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone

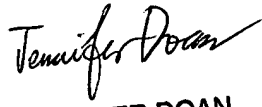
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number for the organization where this application or proceeding is assigned is 571-273-8300.

6. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JD

January 31, 2007


JENNIFER DOAN
PRIMARY EXAMINER